Equity Home Bias and shocks in the economy

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Biographical Note

Maria João Zamith de Passos Machado Ferreira was born in Guimarães in 1992. She completed her BSc in Economics from the University of Porto – School of Economics and Management in 2013. Throughout her academic years, she was involved in several extracurricular activities such as co-founding Academia de Política Apartidária (APA) at the University of Porto; joining AIESEC in FEP and becoming Finance Team Leader; 6-week volunteering internship in Mexico teaching English and Portuguese to unprivileged children; and 2-month summer internship at Caixa Geral de Depósitos. In September 2014, she started her Master's Programme in Finance at the University of Porto – School of Economics and Management. In October 2015, she enrolled at an energy start-up company – Energia Simples. From January 2016, she has been working as a financial analyst at Brisa Auto-Estradas de Portugal.

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Abstract

Equity Home Bias was first exposed by French and Poterba (1991) as the overweight of domestic equity in an investor portfolio when compared to the optimal weight in the international diversified portfolio. Home Bias has been since then a puzzle to the financial literature due to its persistence over time and lack of sustained explanations. In this study, we intend to analyse the factors that drive Equity Home Bias, in particular over the period most affected by two major shocks in the economy, namely the Global Financial Crisis and the European Sovereign Debt Crisis. The analysis uses the data from a sample of 21 EU countries over the period from 2001 to 2015.

Key words: Equity Home Bias; Global Financial Crisis; European Sovereign Debt Crisis

JEL Classification: G01; G11; G41

Resumo

O conceito de *Equity Home Bias* referido pela primeira vez no estudo de French e Poterba (1991) como o excesso de peso de ações domésticas no portfolio de um investidor quando comparado com o que resultaria da combinação ótima no portfolio diversificado a nível internacional. O *Home Bias* é desde então um puzzle da literatura financeira devido à sua persistência ao longo do tempo e devido à falta de argumentos que consigam explicar o fenómeno. Neste estudo, pretendemos estudar os fatores que determinam o *Equity Home Bias*, em particular durante o período mais afetado por dois grandes choques na economia, nomeadamente a Crise Financeira Global e a Crise da Dívida Soberana Europeia. A análise incide sobre os dados de uma amostra de 21 países da UE no período entre 2001 e 2015.

Palavras-chave: Equity Home Bias; Crise Financeira Global; Crise da Dívida Soberana Europeia

Classificação JEL: G01; G11; G41

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1. Introduction

Many studies on portfolio diversification and its effects have followed the pioneer work of Markowitz (1952, 1959), and the CAPM (Sharpe, 1964), on portfolio optimization and extended it to the international context (Grubel, 1968; Levy and Sarnat, 1970; Lessard, 1973). The conclusion is that there are larger diversification gains that drive from holding a global portfolio. Hence, according to theoretical literature[1], cross-border diversification of equity portfolios offers potential gains to investors.

However, despite these gains, empirical research has showed that investors tend to overweight their portfolios with domestic equity. This phenomenon is called *Home Bias*.

Many empirical studies have analysed this puzzle. Examples are the works by French and Poterba (1991) and Tesar and Werner (1995). They mention a 90%/10% relation on the weight of domestic equity to foreign equity in the US and Japan's portfolio in 1989. For the UK, the relation was of 80% to 20%[2].

Many studies on international finance have been trying to come up with several explanations for this puzzle, yet there is no consensus nor one argument that stands over time.

Initially, institutional factors such as the existence of formal barriers to trade and high transaction costs were thought to be able to explain the observed weights of domestic holdings in portfolios (see for example, Stulz, 1981a,b; Adler and Dumas, 1983; Black, 1974; Cooper and Kaplanis, 1994; Tesar and Werner, 1995; Ahearne et al, 2004 among others). Yet, for the last decades, great financial and technological development and the abolishment of international investment barriers, have not solved or reduced Home Bias as expected. In fact, from 1994 to 2004 the phenomenon looks as it has stabilized (Kho et al, 2009)[3].

Researchers started to propose a different strand of arguments to try to explain Home Bias, such as behavioural explanations. These were focused on the investors' mindset,

[1] See also (Solnik, 1974b; Grauer and Hakansson, 1987; Eldor et al, 1988; De Santis and Gerard, 1997)

[2] The adjusted market value in June 1990, as reported by French and Poterba (1991), is $2941.3 for the US, $1632.9 for Japan and $849.8 for the UK.

[3] The average US home bias, from a sample of 46 countries

their culture and beliefs and their language, among others, in order to complete existing literature and hence provide enhancements to its possible causes. Yet, these seem to be incomplete, in the sense that the phenomenon is not still fully understood.

In fact, Equity Home Bias has been proven to hold for both individual and institutional investors, for stocks and for bonds, and for nearly all countries examined (for more recent studies, see for example Chan et al, 2005; Sørensen et al, 2007; De Moor and Vanpée, 2013). Also, Home Bias can be extrapolated to a wider economic context, due to its presence in consumption (Lewis, 1999), trade (Obstefeld and Rogoff, 2000), mergers and acquisitions (Grote and Umber, 2007), and even in academic research (Karolyi, 2012), as summarized by Cooper et al (2013).

Since all the explanations regarded by literature have failed to explain completely the phenomenon, we are left with a literature gap, which is why this is still considered a puzzle.

With this study, we intend to gather information on what most has influenced Equity Home Bias between 2001 and 2015 and assess whether there were changes in the impact of the usual driving factors given two major shocks in the economy, over the period (Global Financial Crisis and the European Sovereign Debt Crisis).

Our results indicate that these shocks changed the impact of the explanatory variables on the Home Bias, in most cases magnifying their effects. Overall results are supportive of the hypotheses set based on the possible explanations for Home Bias provided by literature.

The structure of this dissertation is as follows. Chapter 2 presents the literature review, which focuses on the theoretical approaches on the optimal portfolio model and its connection to Equity Home Bias. In addition, the chapter reviews the Equity Home Bias phenomenon and its evolution through time and summarizes the main explanations proposed by the literature. In Chapter 3 we cover the main hypotheses and arguments for the relation of the Equity Home Bias with the proposed explanations. In Chapter 4 we describe our data, sample and methodology, and the empirical variable used in the proposed specification model. We also summarize the main characteristics of the crises

described. In Chapter 5 we present and discuss the estimation results. Finally, Chapter 6 concludes.

2. Literature Review

The following chapter is divided into three sections. The first one explains the reasoning of the Equity Home Bias phenomenon, later we present the empirical results from other studies related to our theme to observe its persistence through time. Finally, we expose and characterize the different possible explanations for this puzzle.

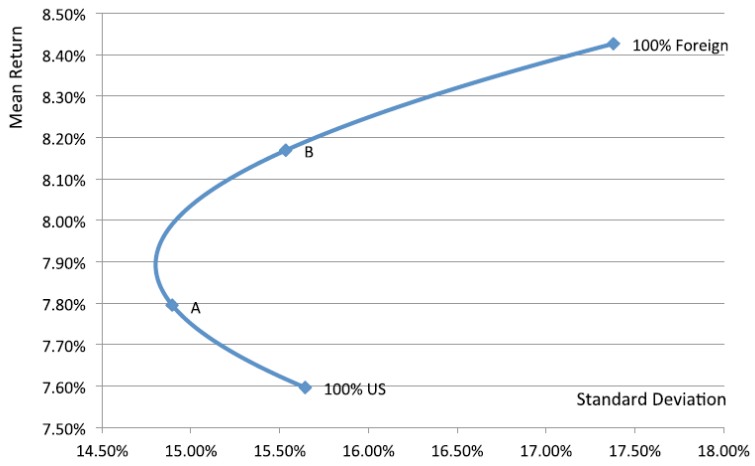
2.1 A Puzzling Phenomenon

The first work on portfolio optimization was developed by Markowtitz (1952, 1959) and was complemented, on an international context, by Grubel (1968), Levy and Sarnat (1970), and Lessard (1973). Also, Solnik (1974a) and Grauer and Hakansson (1987) express the same idea of a reduction of risk of an investment portfolio by incorporating foreign securities.

Following such works, a large body of financial literature was developed, building on the effects of international diversification in portfolios. The common conclusion focused on the large benefits of international diversification in securities portfolios (García-Herrero and Vasquéz, 2013).

Figure 1 intends to prove such conclusion (in a simple mean-variance analysis on a two-country example), by showing that for the same amount of risk, the return is higher when two assets are combined, rather than 100% of one asset.

Figure 1: Efficient Frontier (US and Non-US portfolios)



Source: Cooper et al, 2013

Note: The authors plotted the mean and standard deviation of annualized monthly returns, estimated over January 1970 to December 2011, for various convex combinations of a purely U.S. portfolio and a purely

foreign one. Point A is the U.S.' actually chosen mix. Point B on the curve represents a portfolio that consists of 71% foreign equities and has the same standard deviations as the pure U.S. portfolio.

The figure follows the prediction of financial theory, which indicates that given what an investor holds, international diversification would reduce the risk significantly. The authors still highlighted that an analysis of mean-variance optimization using ex-post means could be questionable, however, despite the possibility of this graphic raising sampling errors, the presence of this phenomenon is so wide that it could not be dismissed as pure chance.

As we will demonstrate ahead, theory has not been translating into practice, which is puzzling due to the proven benefits of concentrating both domestic and foreign stock on a portfolio and the not known offsetting benefits of holding one entirely domestic.

In conclusion, the not fully exploited international gains by investors, translates into an overinvestment in domestic stocks relative to the optimal portfolio that is called *Equity Home Bias*, first developed by French and Poterba (1991) and Tesar and Werner (1995).

2.2 Empirical Evidence

As observed in the previous section, an investor's equity portfolio should be highly diversified and if not, then there is a deviation from the optimal portfolio, which is called Equity Home Bias. In this section we will approach the evolution of this phenomenon throughout the last decades and will infer on what the literature poses on its behaviour.

Cooper and Kaplanis (1994) show that in 1984, 98% of an US investor's equity portfolio was filled with domestic equity against a market capitalization of US equity of 36.4%. However, there were still other countries that faced higher differences, such as Germany with 75.4% against 3.2% and 94.2% against 1.1% for Spain.

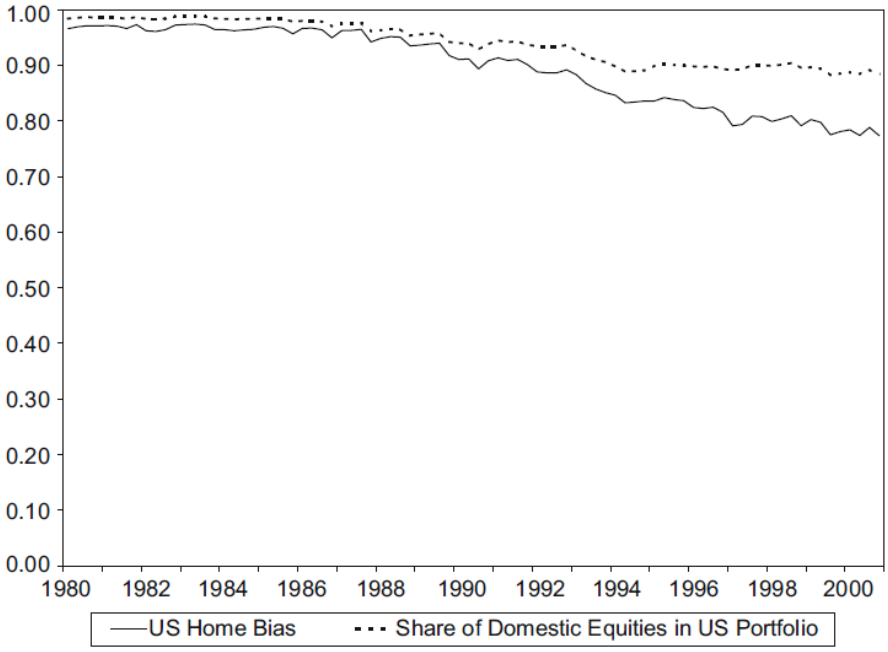
Mondria & Wu's (2010) conclusions (based on data provided by Frank Warnock[4]) state that between 1980 and 1985 the portfolio of American investors was made of 98.5% domestic equities, which translated into an average equity home bias of 96.8% during that period. In the following years, in the period between 1985 and 1994, there was a decrease

[4] Co-author of Ahearne et al (2004)

in the share of domestic assets of almost 10pp. After 1994, it has stabilized until the end of the sample – 2000.

These conclusions can be observed in the following figure that presents the evolution of the share of domestic equities and the evolution of home bias in the US portfolio, from the first quarter of 1980 to the last quarter of 2000. The declining era of the mid-80's to mid-90's is easily observable and is especially due to the abolishment of institutional restrictions to international financial development.

Figure 2: Home Bias and Share of Domestic Equities in US Portfolio



Source: Mondria and Wu, 2010

Studying a larger sample period, Amadi (2004) found that from 1986 to 2001, international diversification had increased in each country out of 12 industrialized economies, and 7 of them showed dramatic increases in the foreign portfolio compositions during the 90's[5], going from an average of around 7% in 1994 to around 37% in 2001.

Additional contributions were made by Sørensen et al (2007) for the period 1993 to 2003, who concluded that the home bias, both in equities and bonds, decreased for 24 OECD

[5] The countries included are: Austria, Denmark, Finland, Italy, New Zealand, South Africa, and Spain

countries[6], with the Equity Home Bias decreasing, on average, from 83% to 67% and the Debt Home Bias from 63% to 52%.

Baele et al (2007) introduces an explanation focusing on the euro zone, and concludes that since the introduction of the common currency, the diversification trend has been strong. Cooper et al (2013) also follow that statement, but build on a smaller sample of the four biggest industrialized countries and four emerging countries from 2001 to 2010[7].

Home Bias shows a decreasing tendency over the last decades, mostly due to the enhancement and the availability of telecommunications and technological innovations, the easiness in the access to the internet, the diminishment of transaction costs and the abolishment of formal barriers to foreign investments. According to models based on institutional factors, it was expected a significant drop in the Home Bias, however that decrease has been very slow, as portfolios remain severely under-diversified.

2.3 Main Explanations

As explained in the two previous sections, Home Bias is a puzzling phenomenon that has persisted through time. The deviations observed between the portfolio weights and the world market weights, considering the ICAPM optimal portfolio as the benchmark, can be viewed as abnormal and in need of an explanation.

Different contributions on the Home Bias have stressed on the possible justifications for such behaviour, and following the approach provided by French and Poterba (1991), we present two broad explanations: Institutional or Fundamental – institutional or economic "factors may reduce returns from investing abroad or that may explicitly limit investors' ability to hold foreign stocks" – and Behavioural – "[explanation that] focuses on investor behaviour".

[6] The countries included are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Mexico, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the UK, and the US

[7] Industrialized countries include: France, Germany, the United Kingdom and the US; emerging countries include: Argentina, Malaysia, Poland, and Turkey

2.3.1 Institutional Explanations

Direct Barriers

In the 70's, capital controls were preponderant in the restrictions of equity flows and as such, were a satisfying justification for the disproportion of domestic equity in an investor's portfolio, however, nowadays such reason is no longer broadly accepted (French and Poterba, 1991).

Given the financial globalization and the efforts to diminish protectionism world-wide, most investors from western developed countries do not seem to be especially affected by institutional regulation, however, a country's policy on exchange regulation and capital restrictions is a factor that affects an investor's opportunity to widen its international portfolio both ways. This means that it may difficult a domestic investor to approach foreign assets but also for a foreigner to invest in the domestic market (Cooper et al, 2013).

Transaction costs associated with holding a foreign asset are commonly described as commissions, fees and market impact costs or liquidity costs[8] and were not portrayed as being one robust justification for Home Bias because they would have to be unrealistically high as to discourage foreign investment (Ahearne et al, 2004; Jeske, 2001). French and Poterba (1991) also emphasize that transaction costs ought to be lower in more liquid markets, therefore investments should be made towards those markets and not necessarily to the domestic market. Finally, the authors also state that given the large amounts of equity flows world-wide, transaction costs fail to explain Home Bias by themselves.

However, opposite conclusions emerged when focusing on the impact of taxes in the Equity Home Bias. Black (1974) considers that severely taxed investors tend to prefer the domestic market and in his model, international markets are segmented and the expected rate of return on the asset is affected by the existence of taxes, which leads to the decrease of the risk premium, conducing ultimately to the reduction of international diversification gains.

[8] Liquidity costs are intended to measure the deviation of the transaction price from the price that would have prevailed had the trade not occurred. See Ahearne et al (2004) for more details.

Lewis (1999) extended Black's (1974) model by focusing on shares, in two-countries and in the holding of purchasing power parity. By considering that taxes represented a participation cost to foreign markets, the author presented that this variable decreased the optimal proportion invested in the domestic market by foreigners. Finally, the author showed that when costs or taxes increased, the domestic holdings of foreign stocks decreased, proving that transaction costs influenced the reticence of investors to international diversification.

However, the development and liberalization of capital markets has been weakening direct barriers to international investment and as economies become more deregulated, the less explanatory this phenomenon is. Its persistence, thus, demands additional explanations.

Information Asymmetry

The preference for domestic equity due to information asymmetries is a popular explanation among the literature and intends to show that in the presence of different information, risk-averse investors will prefer stocks they have more information in because they perceive them as less risky. Those stocks are usually the domestic ones (Cooper et al, 2013). Merton (1987) concludes that information costs may affect an investor's behaviour given its perception of risk. This inference has had empirical support, such as investment in large firms being a great proportion of foreign equity portfolios (Kang and Stulz, 1997), information flows being an important element of cross-border equity transactions (Portes and Rey, 2005) and investors leaning towards holding local companies' stocks (Coval and Moskowitz, 1999) or at least, geographically close.

Information advantages, from a domestic investor point of view, range from the business practices in his home country, to the economic and political context, to the language (meaning that there is a perfect interpretation of all news articles and financial reports) and to the adaptation costs to different cultural or religious habits (Grinblatt and Keloharju, 2001).

In addition, it would be expected for informational advantage to provide greater directions in stock picking, which would lead that investor to realize higher returns on his equity investments. Dvorak (2005) concludes that domestic investors in the Indonesian market

outperform foreigners and Hau (2001) explains the lower returns of Germany non-residents and German non-speakers relative to locals. Despite Grinblatt and Keloharju (2000) and Huang and Shiu (2009) showing that for the Finnish and Taiwanese markets, respectively, the outperformance of foreigners relative to domestic investors was greater, the foreign investors' sample was composed mostly by professionals, who are supposed to be more experienced, which means that those results may not be due to genuine information advantages. Actually, Malloy (2005) and Bae et al (2008), compare the precision of earnings forecasts of domestic analysts to non-resident analysts and conclude that locals outperform foreigners, which expresses the idea that indeed there are information advantages for residents.

Kang and Stulz (1997) even conclude that foreign investors are more drawn to invest in Japanese companies they know better even though those may have lower expected returns than other Japanese stocks.

Even though many proxies for information asymmetry have turn out to have significant coefficients (Cooper et al, 2013) and that it is the one explanation that has received most of the attention (Amadi, 2004), Jeske (2001) indicates that depending on the sufficiently high/low signal a domestic investor receives on the expected return, informed investors would hold more/less of domestic stocks. In theory, if an investor holds more and better information on domestic assets, he faces lower variance of domestic equity returns and his expected returns ought to differ from the foreigner's. Thus, the characteristic of the signal (high or low) on a domestic stock affects the expected return, which should mean that, at least in some periods, uninformed investors' holdings on domestic equity would surpass the ones from domestic investors, i.e. "the home bias would be *reversed* in periods in which domestic investors gather a signal indicating low returns." (Jeske, 2001). However, in reality, such behaviour was not observed, since there has been a persistent Equity Home Bias throughout the years, as we mentioned in the previous section.

Hedging Opportunities

Most financial literature considers that holding a domestic stock provides hedging for two home-country specific risks: inflation and non-traded assets.

One of these hedging opportunities surfaces when the Purchasing Power Parity (PPP) does not hold[9], which translates into the existence of different inflation rates across countries, implying a greater demand for international securities to hedge domestic inflation risk.

A perfect hedge against inflation risk would have been provided by index bonds, however they are not available to most countries (Cooper et al, 2013). Domestic equities are then perceived as a second-best hedge alternative, considering the uncertainty about future inflation rates (Friend et al, 1976), but only if risk aversion exceeds unity and if there is a positive correlation between domestic equity returns and inflation rates. However, since the disappearance and re-appearance of inflation linked bonds in markets such as the US and the UK did not match any accordingly variation in the Home Bias (Cooper et al, 2013), domestic stocks could not be considered as a great alternative.

The models of Adler and Dumas (1983) and Stulz (1981b) evidence that different inflation rates among different countries create a demand for assets to hedge for inflation, leading to a probable different equity portfolio among investors because each one in each country consumes different goods, which leads to different inflation risks. Later, Cooper and Kaplanis (1994) examined the role of inflation and equity results and concluded that the home bias could not be explained by inflation hedging unless investors have very low levels of risk aversion.

Thus, for the rationale of this hedging opportunity to prevail, there would have to be a positive correlation between inflation and returns, so home bias could be explained if domestic equities provided a hedge against inflation risk (Mishra, 2015). Boudoukh and Richardson (1993) find that there is a positive relation between nominal stock returns and inflation over longer periods. Kim and In (2005) show that for a very short horizon (1 month) or a very long period (greater than 128 months) there is a positive correlation, as

[9] A robust part of the literature has rejected the hypothesis of Purchasing Power Parity, except perhaps in the very long run (Froot and Rogoff, 1995)

for the period between, there would be a negative correlation. Fama (1981) and Barnes et al (1999) do not conclude in terms of horizon, the authors just show that there is a negative correlation between stock returns and inflation rates. Given this context, investors' real wealth would already be compromised and their domestic equity returns would diminish as well. Thus, investors would short their domestic holdings to hedge against inflation risk, which is the opposite of reality (Cooper et al, 2013).

In a final note, consumption prices evolve differently across countries even after translating into the same currency, which affects real returns. Thus, depending on what currency an investor uses, nominal returns from a certain asset diverge. Portfolio choice may then be affected in the presence of real exchange risk, that surfaces when holding the same asset, investors' real returns are different. Fidora et al (2007) show that Home Bias was reported to be higher in countries that have higher exchange rate volatility, performing as a higher bias in countries with low volatility of returns.

Another source of country-specific risk that could clarify the home bias, focuses on the wealth of nontraded assets such as human capital. The rationale is that price uncertainty surrounding nontraded goods creates a motive to invest in domestic equities and if nontraded labour income is negatively correlated with domestic equity returns, then domestic equities are a hedge for labour income (Fellner and Maciejovsky, 2003; Cooper et al, 2013). However, empirical evidence on this correlation has mixed results. Baxter and Jermann (1997) show that human capital returns are highly correlated with domestic returns but not with foreign stock returns, which implies that to hedge such risk an investor would short sell domestic stocks, rather than home-biasing their portfolios. In contrasting results, Bottazzi et al (1996) and Lustig and Van Nieuwerburgh (2002) find negative correlations between human capital and domestic equity. More empirical works have concluded that hedging the risk of nontradables fails to explain Home Bias, because addressing it only leads to a minor bias towards domestic assets, which is not large enough to explain the Equity Home Bias observed (Pesenti and Van Wincoop, 2002) and because investors tend to create their portfolios in such a way that the correlation goes up rather than down, as it would be expected (Massa and Simonov, 2006).

Governance and Regulation

In a country, a good legal system backed by laws and regulations that protect investors, aligned with a balanced level of economic and financial development, contribute to benefit from good governance.

Kho et al (2009) mention that a governance improvement has a direct impact in Home Bias because a firm's value is maximized with less insider ownership, which leads to greater holdings of portfolio investors, that would not only include domestic investors but also, foreign ones.

Cooper et al (2013) link the lack of transparency with information asymmetries, affecting therefore an investor's expected returns, but also mention that poor governance practices and the non-existence of suitable accounting standards within a company result in higher information costs and less protection to minority shareholders.

Dahlquist et al (2003) suggest that free float market capitalization should be used to approach Home Bias instead of total market capitalization due to the nontraded equity of controlling shareholders. However, there still seemed to be a strong bias after that correction.

Giannetti and Simonov (2006) find that all categories of investors (domestic and foreign, institutional and small individual) who are presumably tilted towards only security benefits, are reluctant to invest in companies with weak corporate governance and Leuz et al (2010) conclude that foreign investors are stimulated by countries with good outsider protection and with ownerships structures that provide no governance problems.

After presenting these rationla arguments, and given the persistence of Home Bias, academics were led to believe that institutional explanations only explained partially this phenomenon. This conducted financial literature to start focusing on a different strand.

2.3.2 Behavioural Explanations

These behavioural explanations stand on the principle that investors are not completely rational when making an investment decision (Ricciardi, 2008).

Familiarity

The familiarity bias has an interesting weight in the Home Bias (Huberman, 2001; Grinblatt and Keloharju, 2001; Chan et al, 2005), as it is "[…] associated with a general sense of comfort with the known and discomfort with - even distaste for and fear of - the alien and distant." (Huberman, 2001). Complementary, Seasholes and Zhu (2010) and Pool et al (2012) evidenced that this comfort is generally associated with less experienced investors since it is viewed as a central cognitive element of place attachment (Scannell and Gifford, 2010).

As mentioned in the information asymmetry explanation, investors tend to have more stocks of large firms in their portfolio (Merton, 1987) because they have facilitated access to information of such firms, meaning that they have access to more quantity and, usually, to more quality of data. This translates in knowing them better, being more familiar with their history and accomplishments, positive or negative.

Underinvestment in foreign assets is explained by Beugelsdijk and Frijns (2010) as being due to the culture of a society and its distance towards the other market. The distinction is based on a society more uncertainty averse (which invests less in foreign stocks) and on a more individualistic one (that invests more in foreign stocks).

Overconfidence

An investor who believes he has full knowledge concerning a determined investment is more familiar with those assets (which are typically domestic assets) and has the perception to have an information advantage, which leads to an overweight of domestic stocks as Cooper et al (2013) explained, based on the work by Tversky (1991) and Fox and Tversky (1995).

Patriotism

Morse and Shive (2011) found that more patriotic countries (based on questionnaires of the World Values Survey), are more home biased even after controlling for transaction barriers, diversification benefits, information and familiarity.

Beliefs and Conservatism

Given the information available, investors tend to focus on and give more importance to that which confirms their beliefs, even when new information arises, they are more reticent to change them and maintain relying on their priors. Ritter (2003) considers that a variation of events might lead investors to underreact, given the conservatism bias, although when focusing on a long enough pattern, those *conservatives* will adjust and possibly will translate into an overreaction, underweighting the long-term average.

Also, Lord et al (1979) argue that after an investor forms an opinion, he usually hangs on it for too long and has a very inactive information-searching position that contradicts his beliefs. Investors might go as far as when finding such evidence, treat it with scepticism.

Hour-shifting

Sendi and Belallah (2010) explain that the different time zones across the world can be a psychological barrier to international investment because efficiency is diminished with geographically far markets. This statement is sustained under the idea that at any time of the day, there are closed financial markets and, even though an investor can obtain the information set about assets, managing and holding a global portfolio becomes more difficult and cannot be done optimally.

Retrenchment

In the presence of a shock in the economy there is added uncertainty that should lead to a home bias increase (Ellsberg, 1961, Heath and Tversky, 1991).

This approach is also present in the more recent and developing retrenchment literature, that concludes that, under these situations, investors tend to leave foreign markets and focus on domestic ones (Milesi-Ferreti and Tille, 2011; Forbes and Warnock, 2012; Fratzscher, 2012). More evidence is shown by Goetzmann et al (2001), Ratanapakorn and Sharma (2002) and Das and Uppal (2004) that state the weakening of potential gains from international diversification during market crisis.

The increase in uncertainty (Caballero and Krishnamurthy, 2009; Easley and O'Hara, 2010) and the boost in the familiarity bias (Cao et al., 2011) are also documented as a cause in the reduction of the foreign portfolio share, if investors are ambiguity averse.

In conclusion, nowadays the big debate regarding the explanations for Home Bias is mainly focused on the dichotomy Institutional/Fundamental vs Behavioural explanations, however the last are difficult to construct and to measure. In the following chapter, we will present the main hypotheses for our empirical model based on the theories and explanations abovementioned.

3. Main Arguments and Hypotheses

In this chapter, we develop the hypotheses for our work based on the theories and studies on Equity Home Bias presented previously.

Direct Barriers

Financial Openness

As discussed previously, financial barriers seem to affect positively Home Bias, hence financial market openness gives investors the incentives to hold foreign assets and therefore to benefit from international diversification (Bose et al, 2014).

Taxes

One of the most common transaction cost, is the impact of taxes in the investors' decision process. These are expected to diminish the gains of international diversification and hence, increase Equity Home Bias (Lewis, 1999).

Hypothesis 1 (H1): Direct Barriers are expected to decrease international investment flows, hence are expected to increase Equity Home Bias.

Information Asymmetry

Geographical Distance

The interaction of economic agents and exchanges is affected by the geographical distance between countries and hence, investors prefer to be geographically close to reduce information costs and diminish any differences (cultural, linguistic, legal, etc) (Guiso et al, 2005).

Neighbouring countries are more incited to have better knowledge on each other, not only due to better media coverage but also to better tourist and business links and Portes and Rey (2005) even state that with a higher distance, the more expensive the travel is, and hence cultural differences are expected to arise and to be stronger. Eventually, this will weaken business links.

Cooper et al (2016) define *Pure Home Bias* as the amount by which home bias exceeds the level that would be predicted for a foreign country with zero "distance" and answer

the question “To what extent is the home country different from a hypothetical foreign country that has a “distance" of zero?”. They have concluded that for most countries the *Pure Home Bias* is zero, which means that distance has a decisive role in an investor’s equity allocation policy. Since geographical proximity provides investors lower information gathering costs due to cultural similarities and familiarity, they are more drawn to invest in such contexts.

Considering the cultural and language differences, familiarity is also widely used under the information asymmetry explanation given that information flows and information understanding is better perceived when those differences are low.

Internet Use

An alternative proxy for information flows worldwide is the number of internet users. Internet has been boosting and is one of the basis for globalization since it allows investors, for example, the access to more information and quickly than ever before. Even though, it solely does not explain diversification by itself, it most definitely incited the familiarity on the English language and its dissemination throughout all information, which leads to a greater number of people gathering and studying such information, diminishing the language and the availability barriers (Amadi, 2004).

Hypothesis 2 (H2): International information asymmetry is expected to increase Home Bias, since it increases information costs and decreases net returns affected by foreign assets.

Hedging Opportunities

Exchange Rate Risk

Monetary unions and a single currency diminishes the need for hedging when trading either goods or financial assets, as stated in the study of Baele et al (2007), which reduced Home Bias.[10]

Hypothesis 3 (H3): Exchange rate barriers are expected to increase Home Bias

[10] Baele et al (2007) conclusion proved to be true for EMU countries

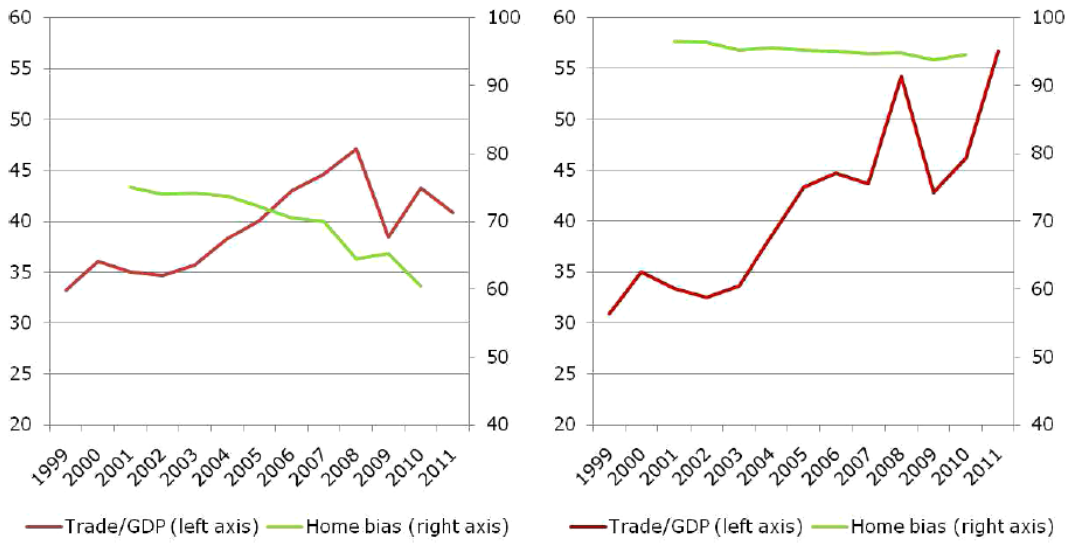
Familiarity

Exchange Trade

Portes and Rey (2005) state that there is a connection (in terms of investment and distance) between the trade of consumption goods and financial assets.

In addition, Lane and Milesi-Ferreti (2008) concluded that bilateral equity investment is strongly correlated with underlying patterns of trade in goods and services. Cooper et al (2013) compared the average trade volume and the Equity Home Bias for developed economies (OECD countries) and for developing countries (the 50 countries with the lowest scores on the Human Development Index), and concluded that, even though in the latter the increase in trade was much higher, equity home bias has only decreased marginally and remains at much higher levels. The following figure translated this analysis.

Figure 3: Average Trade Volume and Equity Home Bias for OECD Countries (left) and Developing Markets (right)



Source: Cooper et al (2013)

Since our sample is composed by developed countries, our expectations are that higher trade is related with lower Home Bias.

Hypothesis 4 (H4): Higher trade flows between countries are expected to decrease Home Bias

Governance and Regulation

Domestic Governance

Cooper et al (2013) state that opposing the foreign bias[11] logic, a country with high standards at home should make foreign countries less appealing. With this rationale, Equity Home Bias is expected to increase with higher domestic governance.

Hypothesis 5 (H5): Domestic Governance high quality standards and regulation are associated with more (increased) Home Bias

Concentration

Company and Industry Concentration

The more industry diversified a country is (and hence, with a larger opportunity set in the home country), and the larger (listed) companies, the less predisposition there is for international diversification. Familiarity is related to this argument, meaning that large firms are more noticeable, which implies that information gathering costs and asymmetries are lower and also, they are more liquid than small firms (in general) reducing transaction costs (Cooper et al, 2016).

Hypothesis 6 (H6): In countries where stock markets have fewer investable opportunities with regard to companies and industries, Home Bias is lower

Size

Market Size

As reported by the ICAPM theory, investors should diversify according to their country's share of world capitalization, hence this hypothesis serves to prove financial theory. However, empirical evidence (Amadi, 2004; Mishra, 2015) shows that a larger country is

[11] Foreign bias is the relative underweight of securities from countries that are far from home geographically, economically, culturally, or informationally

expected to have better diversification opportunities at home and that if there is an increase in the home country share in the world capitalization, then the investor would decrease his or her foreign investments.

Hypothesis 7 (H7): In large countries, with greater opportunity set at home, Home Bias is less significant

Retrenchment

Theories of home bias and of portfolio choice under uncertainty both predict that the home bias should increase during a financial crisis (Mishra, 2015). Financial crises originate mistrust in financial institutions and in governments creating a downward trend in business confidence.

We explore/test whether Home Bias changes in periods of financial and economic crises.

Hypothesis 8 (H8): In situations of greater uncertainty, Home Bias is expected to increase, due to retrenchment behaviour

Table 1: Summary of the Hypotheses

Hypotheses Number	Argument	Expected relation with Home Bias
H1	Direct Barriers	Positive
H2	Information Asymmetries	Positive
H3	Hedging Opportunities	Positive
H4	Familiarity	Negative
H5	Domestic Governance	Positive
H6	Concentration	Negative
H7	Size	Positive
H8	Retrenchment	Positive

Table 1 summarizes the set of hypotheses and what is the expected sign of the relation. In the next chapter, we present the data and methodological approach to test our hypotheses.

4. Methodological Aspects

In this chapter, we describe the data and present the model specification we use to test the hypotheses approached in the previous chapter. Additionally, we describe the variables used in the model.

4.1 Sample period and economic shocks

Our sample period covers two major economic shocks that affected the countries in our sample, namely the Global Financial Crisis and the European Sovereign Debt Crisis. Below we provide a brief explanation of those events.

4.1.1 Global Financial Crisis

The more recent financial crisis is considered as the worst financial crisis since the Great Depression of the 1930's and is known as the "Great Recession". It was first originated in the US, after BNP Paribas announcing that it was ceasing activity in three hedge funds specialized in US mortgage debt. House prices abruptly decreased and subsequently there was a reduction in the construction activity.

The transition from the housing market to financial institutions and financial markets in the US was swift and a year after, in September 2008, the investment bank Lehman Brothers went bankrupt.

Within a month, the domino effect had already taken place and the global financial system was compromised, with governments having to inject vast amounts of money into their banks to prevent them from collapsing. Credit flows to the private sector became scarce and business and consumer confidence severely affected.

To prevent the recession from worsening, several stimulus and coordination actions took place, such as the creation of the G-20[12], as well as the implementation by Central Banks of non-conventional monetary policies (Quantitative Easing).

[12] G-20 comprises a mix of the world's largest advanced and emerging economies, representing about two-thirds of the world's population, 85% of global gross domestic product and over 75% of global trade. Its members are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States and the European Union.

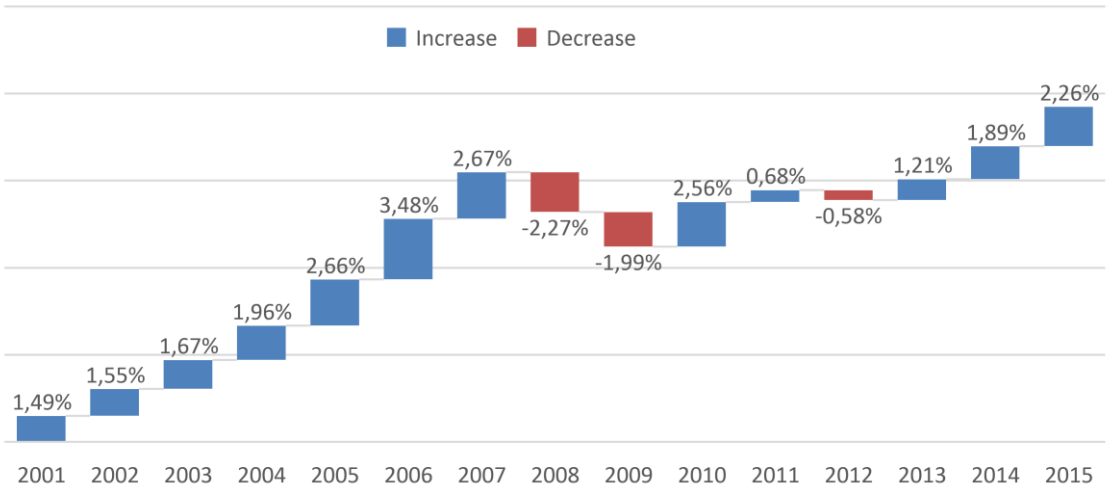
In January 2011, the US Financial Crisis Inquiry Commission concluded that "[…] this financial crisis was avoidable, […] widespread failures in financial regulation and supervision proved devastating to the stability of the nation's financial markets, […] dramatic failures of corporate governance and risk management at many systemically important financial institutions were a key cause of this crisis, […] a combination of excessive borrowing, risky investments, and lack of transparency put the financial system on a collision course with crisis, […] the government was ill prepared for the crisis, and its inconsistent response added to the uncertainty and panic in the financial markets, […] there was a systemic breakdown in accountability and ethics, […] collapsing mortgage-lending standards and the mortgage securitization pipeline lit and spread the flame of contagion and crisis, […] over-the-counter derivatives contributed significantly to this crisis, […] the failures of credit rating agencies were essential cogs in the wheel of financial destruction.".

4.1.2 The impact of the crisis in the European Union

Globalization led to the widespread of the crisis that, despite having started in the US, severely affected most European economies even though some of their banks were not very exposed to the US mortgage derivatives securitisation (Nemeth, 2011). All EU countries were affected, both EMU countries and non-euro ones, however in a different degree, depending on having been through real-estate bubbles and on the level of economic vulnerability (Plamadeala, 2014).

Denmark was the first country to enter the recession, followed by Estonia and Latvia. Following their steps were Germany, Spain and Great Britain leading to a very undesirable outcome where eventually all EU countries suffered negatively from the global financial crisis (Levine and Gerow, 2010).

Figure 4: European Union Real GDP Evolution (Annual YoY%)



Source: Bloomberg Finance, L.P.

Figure 4 evidences the robust decline in the YoY change in the European Union countries' real GDP from 2001 to 2015, evidencing clearly that 2008 and 2009 were the years with the largest GDP decrease. Later, 2012 also embraced a further negative outcome.

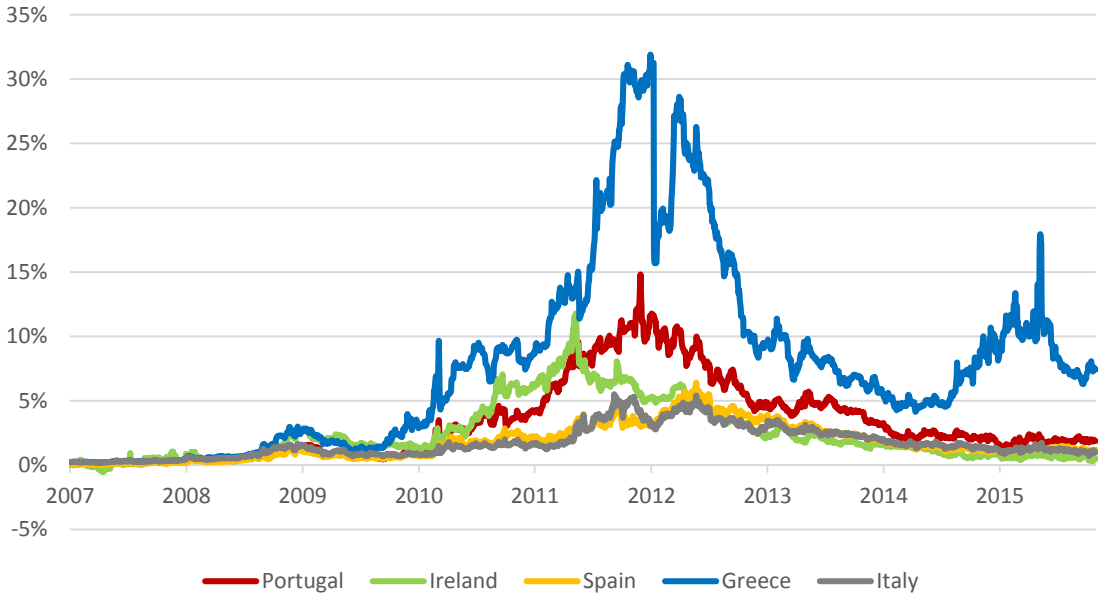
To stabilize financial markets, not only the EU Central Banks intervened, by lowering interest rates and quantitative easing, but also Governments acted to face the financial crisis, by buying shares in banks needing recapitalization and expanding insurance on guarantees for depositors and even, for some cases, guarantees for banks.

However, such actions were not enough in some countries and the credit problems continued (Jackson, 2010).

4.1.3 European Sovereign Debt Crisis

Following the perseverance of the credit problems that arose from the global financial crisis and persisted even after central banks and governments' intervention, EU countries faced a period of slower economic growth. In fact, such period was characterized by the collapse of financial institutions, high government debt and the substantial bond yield spread increases in peripheral countries. Consequently, the most indebted European countries were unable to repay or refinance their government debt.

Figure 5: 10Y Government Bond Spread to German Bund



Source: Bloomberg Finance, L.P.
Note: Cyprus was disregarded from this analysis due to data unavailability

Figure 5 shows the impact of the sovereign debt crisis in the peripheral Eurozone countries' government bond yields. In late 2009, the spread started to increase in all countries but mainly in Greece[13].

In late 2009 the sovereign crisis affected several European countries such as Portugal, Ireland, Spain, Greece, Italy and Cyprus. These countries, required third-party assistance from financial institutions such as the European Commission, the European Central Bank and the International Monetary Fund from 2011 onwards.

Accordingly, these countries had to face many difficulties and impose austerity measures, raising taxes and cutting on government spending. Ultimately, they suffered sovereign ratings downgrades to non-investment grade levels, in some cases.

As observed in Figure 4, only in late 2012 the 10Y government bond spread to German bund in these countries started to decrease even though the economic turbulence and the

[13] "when a new Greek government revealed that previous governments had been misreporting government budget data, higher than expected deficit levels eroded investor confidence, causing bond spreads to rise to unsustainable levels. Fears quickly spread that the fiscal positions and debt levels of a number of Eurozone countries were unsustainable." (Nelson et al, 2012).

efforts demanded from these countries did not stop. The period of higher uncertainty in the EU was therefore from 2010 to 2012.

In conclusion, our sample covers the period between 2001 and 2015 and our crises period is comprehended over 2008 to 2012.

4.2 Data

4.2.1 Sample

Our initial sample comprises the 28 countries within the European Union, namely Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and the UK.

4.2.2 Home Bias Measurement

Sharpe (1964) and Lintner (1965) developed the first Capital Asset Pricing Model (CAPM) even if under a strict set of assumptions. The authors showed that the efficient portfolio on the Capital Market Line must be the market portfolio and so, all investors will hold it, leveraging or de-leveraging it with positions in the risk-free asset to achieve a desired level of risk. This model assumes that all investors are of the mean-variance type, have the same beliefs about the distribution of real asset returns, that there is homogeneity on the investment opportunities and there are no transaction costs or taxes.

With the great integration of international stock markets, one of the strategic implications of the CAPM is that the ultimate equity portfolio (measured in terms of maximum return per unit of risk) is the global portfolio. In other words, equity investors should strive to own their proportional share of all the world's traded stocks. However, for the CAPM model to be valid in a world scale, there must be the assumption that purchasing power parity holds, which suggests that the same real rates of return are perceived by all investors.

The strict set of assumptions mentioned led to the development of expansions to the model that added factors and relaxed some assumptions. One of those led to the International Capital Asset Pricing Model (ICAPM) developed by Solnik (1974b) and Sercu (1980), that not only implies that all investors hold the world market portfolio, but

also considers exchange rates as an additional variable that influences the return on assets. It allows deviations from purchasing power parity but assumes that inflation risk in each country can be perfectly hedged holding a local real-risk-free bond.

The main assumption it holds on to is that international capital markets are integrated, which means that if it proves not to be true, then there is room for price discrepancies between assets with the same risk profile, but with different currencies, which would lead to a higher allocation of assets in a specific country. It also assumes that there is unlimited lending and borrowing at the risk-free rate.

The conclusion retrieved from this model is that one of the most important factors in an investor decision is that he should diversify his portfolio considering his country's share in the world capitalization (Amadi, 2004). The rationale is that the share of country *i*'s equities invested in country *j* (I^*_j) is the ratio of market capitalization of country *j* in the world market capitalization.

$$I^*_j = \frac{MCj}{MCworld} \tag{4.1}$$

where MC_j is the market capitalization of country *j* and MC_{world} is the world market capitalization. This ratio is then the benchmark of portfolio holdings to which the actual portfolio holdings are compared.

Since most of the empirical work on the CAPM considers the freely tradable assets to be represented by all the listed stocks, the corresponding market portfolio is commonly taken to be a portfolio of all listed public equities. Considering that expectations and opportunities remain homogeneous regarding the home country of an investor, then all investors would hold the same portfolio of risky assets, which ultimately would be the world market portfolio (Cooper et al, 2013).

Researchers have developed other models that are compiled and analysed in more detailed by Mishra (2015), but we decided to use the classical approach because it has been extensively used in home bias literature and examples such as Mishra (2015) and Baele et al (2007) validate the ICAPM and show that it holds for a large part of their sample.

Following most of the studies on the theme[14], we measure Equity Home Bias using the traditional approach where it represents the difference between actual and ICAPM weights. Thus, allows to account for the degree in which domestic equity is overweighed in country *i*'s investment portfolio when compared to foreign equity, through equation 4.2:

$$EHB_i = 1 - \frac{Foreign\ Equity_i}{Foreign\ Equity\ to\ Total\ Market} \qquad (4.2)$$

Foreign Equity$_i$ = share of country *i's* holdings of foreign equity in country i's total equity portfolio (1 - share of domestic equity);

Foreign Equity to Total Market$_i$ = the share of foreign equity in the world portfolio available to country *i* (1- share of country *i* in the total market capitalization).

This ratio is expected to be equal to zero in a scenario where there is no preference for equity issued domestically and between 0 and 1 otherwise.

For cross-border holdings we use the International Monetary Fund's *Coordinated Portfolio Investment Survey (CPIS)* data to obtain country specific estimates of non-domestic equity holdings from 2001 to 2015. Hence, we use *Table 11: Geographic Breakdown of Total Portfolio Investment Assets: Equity and Investment Fund Shares* to obtain data for Foreign Equity (foreign investments of country *i*) and for Foreign Holdings of Domestic Equities. CPIS data identifies country-level year-end holdings[15] of non-domestic securities for IMF member countries, however, participation in the survey is voluntary, which means that not all data is available. Another feature of this database is that some members do not disclose the dollar value of their foreign holdings when they believe investors' anonymity is at stake. In the case there is a missing holding value the return is a blank cell, as it was not reported. Finally, all cases where the dollar value is at or below US$500.000 a zero is reported.

[14] See Ahearne et al, 2004; Schoenmaker and Bosch, 2008; Warnock, 2002; Kho et al 2009, for example

[15] CPIS data is collected by the IMF on end-June (as of 2013) and end-December with a lag of about seven months after the measurement date, and published within nine months after the reference date

Finally, domestic market capitalization was retrieved from Datastream but was not available for all countries in the period considered.

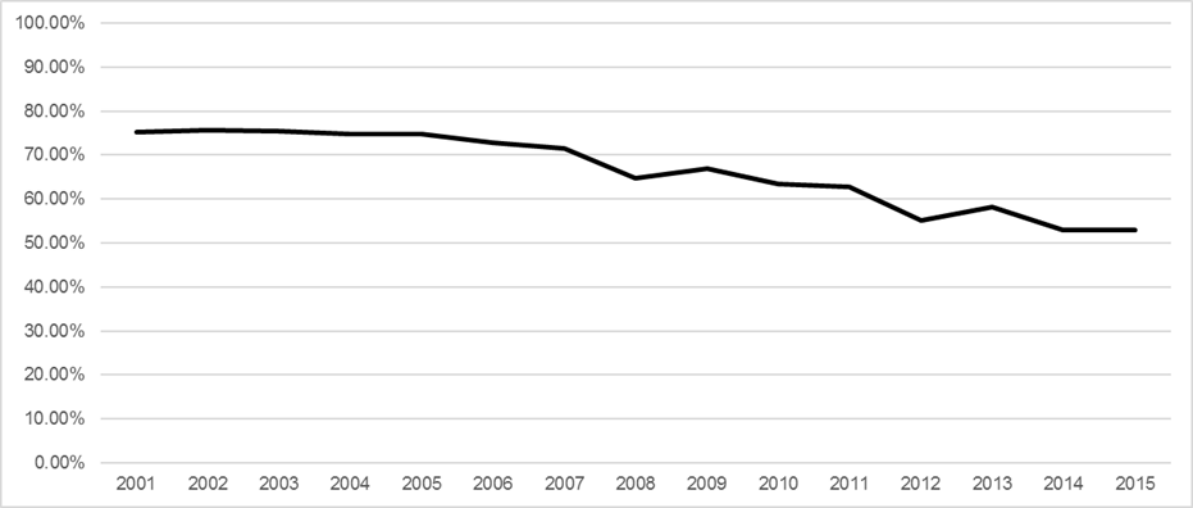
Financial centres such as Luxembourg, Ireland and Cyprus were excluded from the dataset as they represent outliers, as most portfolio investments directed to these countries are routed from there to other destinations (Lane and Milesi-Ferretti, 2008) due to favourable tax policies.

Due to data unavailability, Croatia, Estonia, Lithuania and Latvia were not included in our sample.

Given these data limitations, our final sample is comprised of 21 countries.

In Figure 6, we can observe that the dependent variable, Equity Home Bias, is behaving according to literature over our sample period, meaning that it has diminished through time, but it remains in considerably high levels. Additionally, as the ECB monthly Bulletin (May 2010, p. 38) evidences, Home Bias in Euro Area countries diminished in 2008 comparing with 2007, which was attributed to the lower levels of domestic market capitalisation. After 2008 (the peak of the global financial crisis) we can observe that Equity Home Bias rose, which is consistent with the rationale that crises generate greater uncertainties. The same Bulletin also indicates that this rise is probably related to the temporary increase in the risk of holding a foreign asset and concludes that a prolonged upward trend could generate "important negative implications for global financial market efficiency and ultimately, for the real cost of finance.".

Figure 6: Home Bias Evolution in the EU



Source: IMF, Datastream and our own calculation

4.2.3 Institutional/Fundamental and Behavioural determinants of EHB: proxy variables

We proxy the arguments provided in the literature using the following variables.

- Direct Barriers

1. ***Financial Openness (FINOP):*** We use the *The Chinn and Ito Capital Openness Index* (KA_OPEN) as a proxy for financial liberalization. It was first introduced by Chin and Ito (2006) and is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).* The variables include the presence of multiple exchange rates, the existence of restrictions on current account transactions, the existence of restrictions on capital account transactions and the requirement of the surrender of export proceeds. Hence, by its structure, the Chinn-Ito index is a de-jure measure of financial openness (Mondria & Wu, 2010). Values vary from 0, which represents the "least financial open" countries, to 100 that embodies the "most financially open" countries. The data was retrieved from a 2014 update from Portland State University based on Chin and Ito (2006). Data for 2015 is not available.
2. ***Withholding tax on dividends (TAXDIV):*** We use the withholding tax rate on dividends and, following Mishra and Ratii (2013) rationale, we report the highest rate available. Data was sent by Deloitte (DITS) and is only available as of 2007.

- Information Asymmetry

3. ***Geographical Distance (DISTANCE):*** Following the work of Portes and Rey (2005), we first compute the flight distance between two capital cities (the authors also analysed the distance between financial centres and arrived to the same results) and afterwards, we average those results and apply the logarithm (Cooper et al, 2013). The values were retrieved from World Atlas.
4. ***Internet use (INTERNET):*** This proxy is the total number of internet users per 100 persons and was retrieved from the World Banks's World Development Indicators based on the works of Mondria & Wu (2010) and Amadi (2004).

- Hedging

5. ***Exchange Rates (FOREX):*** Following De Moor and Vanpée (2013), we approach this hypothesis by creating a dummy variable (*Euro*), which takes the value 1 if the country is an EMU member, and zero otherwise.

- Familiarity

6. ***Exchange Trade (TRADE):*** We compute the method presented by Mishra (2015) which sums the imports and exports of goods and services for each year in the sample period, divided by the Gross Domestic Product of the domestic country. Data is retrieved from the World Bank.

- Governance and Regulation

7. ***Domestic Governance and Regulation (RL and RQ):*** Kaufmann et al (2010)'s six governance measures contemplate numerous aspects of the governance structures of a broad of cross section of countries. The information is gathered through cross-countries surveys as well as polls of experts. There are six indicators, each representing a different dimension of governance – Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption – where a higher level for these variables corresponds to a better governance outcome. We followed Mishra (2008) and used two indicators: Rule of Law (RL) and Regulatory Quality (RQ). Rule of Law index focuses on concepts related with the enforceability of government and private contracts,

fairness of judicial system, the quality of contract enforcement and the likelihood of violent and organised crimes. Regulatory Quality index consists of indicators related with the ability of the government to implement strong policies and regulations to promote the private sector development, namely indicators related with regulation of imports and exports, business ownerships, banking, foreign investment, price controls, tariffs, unfair competitive prices, among others. These yearly data were retrieved from the Worldwide Governance Indicators. Data for 2001 not available.

- Concentration

8. ***Company Concentration (COMPCONC):*** We use the Herfindahl-Hirschman Index to measure company diversification by computing the sum of the square of the market share of each listed company. Data retrieved from Datastream.
9. ***Industry Concentration (INDCONC):*** We use the Herfindahl-Hirschman Index to measure industry diversification by summing the square of the weight of an industry in the index market capitalization of each country. Data retrieved from Datastream.

- Size

10. ***Market Size (MKTSIZE):*** We measure the market size as the log value of origin country's market share of the world market capitalization (Mishra, 2015). Data retrieved from Datastream.

4.3 Empirical Models

We propose a model to analyse the effects of the main arguments in the literature on Equity Home Bias and account for eventual differences in periods of major economic shocks.

To estimate the model parameters, we use panel data composed of 21 (countries) x 15 (years) observations.

Panel data has both cross-sectional and time series dimensions and to gather such information, the same individuals are followed across time, and thus provides multiple observations on each individual in the sample. Time-constant unobserved attributes' presence must thus be considered (Wooldridge, 2013) and panel data allows to control for omitted (unobserved) variables.

The most used methods dealing with panel data are pooled OLS, the Fixed Effects and the Random Effects model and so we will do the appropriate tests to conclude on which model is the most suitable for our analysis.

In the interest of taking advantage of most of the sample observations and get reliable results, we will perform a baseline model and after we will gradually introduce additional variables into robustness checks. These additional variables include another source of direct barriers, such as taxes, and the concentration control variables.

Moreover, the major contribution of our work is to analyse different time periods to account for the impact of the Global Financial Crisis and the European Sovereign Debt Crisis periods on Equity Home Bias. Thus, we use the following specifications.

Our baseline empirical model is described by the following regression equation:

$$EHB_{i,t} = c + \beta_1 FINOP_{i,t} + \beta_2 DISTANCE_{i,t} + \beta_3 INTERNET_{i,t} + \beta_4 EXCRATE_{i,t} + \beta_5 TRADE_{i,t} + \beta_6 RL_{i,t} + \beta_7 RQ_{i,t} + \beta_8 MKTSIZE_{i,t} + \mu_{i,t} \quad (4.3)$$

Where *i* refers to the domestic country and *t* to the year time period. On the left side of the equation we have the dependent variable *Equity Home Bias* of country *i* and year *t*, $EHB_{i,t}$, computed as described in section 4.2.2. On the right side of the equation we considered the independent variables suggested by the literature, as described in the previous section. As for the error term, represented by $\mu_{i,t}$ is composed by α_i which captures all unobserved, time-constant factors that affect the dependent variable, and $\varepsilon_{i,t}$ which represents unobserved factors that change over time and affect the $EHB_{i,t}$ (Wooldridge, 2013) when the models are of fixed or random effects.

Furthermore, we developed an extended model to study the impact of the financial and economic crises on EHB, which uses as a basis equation (4.3) but includes additional variables i) a dummy variable that takes the value of 1 for the years between 2008-2012 (the *crises period*) and 0 otherwise (the *non-crises period*); ii) seven variables resulting from the product between such dummy and each independent variable (FINOP, INTERNET, FOREX, TRADE, RL, RQ and MKTSIZE). The parameters associated with

these variables are estimates of the differential effect of those variables on EHB in periods of crisis. This model is described as follows:

$$EHB_{i,t} = c + \beta_0 D_{i,t} + \beta_1 FINOP_{i,t} + \beta'_1 DFINOP_{i,t_2} + \beta_2 INTERNET_{i,t} + \beta'_2 DINTERNET_{i,t} + \beta_3 EXCRATE_{i,t} + \beta'_3 DEXCRATE_{i,t} + \beta_4 TRADE_{i,t} + \beta'_4 DTRADE_{i,t} + \beta_5 RL_{i,t} + \beta'_5 DRL_{i,t} + \beta_6 RQ_{i,t} + \beta'_6 DRQ_{i,t} + \beta_7 MKTSIZE_{i,t} + \beta'_7 DMKTSIZE_{i,t} + \mu_{i,t} \quad (4.4)$$

where *i* refers to the domestic country and *t* to the year time period.

4.4 Descriptive Statistics

Table 2 illustrates the summary statistics we computed for the variables used in our analysis. The classical Equity Home Bias measure ranges from 6.6% for Portugal in 2012 to 99.9% for Bulgaria in 2003. Throughout our sample, the Equity Home Bias measure has a mean of 67.6%.

The average coefficient of the financial openness variable is 90.7%, which indicates an average low level of direct barriers in our sample, further a few countries exhibit the maximum level of financial openness (Austria, Denmark, Finland, France, Germany, Italy, the Netherlands, Portugal, Spain, Sweden and the UK have displayed the maximum value throughout the whole period of our sample).

Overall, the coefficient of the tax on dividends variable is of 17.3%, with the maximum rate of 75% referring to France. This rate only increases to this level in 2015 and is for payments made on companies located in noncooperative countries.

Malta is the country that most positively contributes for the exchange trade coefficient, with a ratio of 3.25. The governance variables RL and RQ have a mean of approximately 1.14 and 1.2, respectively, in a scale of -2.5 to 2.5, which indicates that our sample has, on average, a good governance quality. The concentration coefficients show that our sample has a diversified set of companies and industries that vary very widely across countries. The average value of the market capitalization translates into a weight of

approximately 1% of the market capitalization of the countries of our sample in the world market capitalization.

Table 2: Descriptive Statistics

This table shows the sample characteristics for the 21 EU countries over the period 2001 to 2015. EHB is computed as in equation 4.2. FINOP is the logarithm of the Chinn and Ito Index. TAXDIV is the highest withholding tax rate on dividends. DISTANCE is the logarithm of the average of the sum of the bilateral flight distance between origin and destination capital cities. INTERNET is the total number of internet users per 100 people. FOREX is a dummy variable that takes the value of 1 if the currency is EUR and 0 otherwise. TRADE is the sum of exports and imports of goods and services measured as a share of gross domestic product. RL is the Rule of Law index from Kaufmann et al (2010) six governance measures. RQ is the Regulatory Quality index from Kaufmann et al (2010) six governance measures. COMPCONC is the Herfindahl-Hirschman Index computed as the sum of the square of the market share of each listed company. INDCONC is the Herfindahl-Hirschman Index computed as the sum of the square of the weight of an industry in the index market capitalization of each country. MKTSIZE is the log value of a country's market share of world market capitalization.

	Mean	Median	Maximum	Minimum	Std. Dev.	Obs
EHB[a]	67.5821	65.4539	99.9255	6.6178	21.8543	247
FINOP[a]	90.6612	100.0000	100.0000	16.4809	20.7721	294
TAXDIV[a]	17.2592	19.0000	75.0000	0.0000	11.4188	189
DISTANCE	3.1545	3.1307	3.5586	2.9936	0.1395	315
INTERNET[a]	59.0781	62.4000	96.3009	4.5000	22.8743	315
FOREX	0.5524	1.0000	1.0000	0.0000	0.4980	315
TRADE	1.0205	0.8587	3.2450	0.4560	0.5179	315
RL	1.1375	1.1623	2.1204	-0.2688	0.6426	294
RQ	1.1998	1.1740	1.9219	-0.0722	0.4276	294
COMPCONC[a]	11.2306	9.1018	95.4849	2.4135	10.0457	209
INDCONC[a]	14.7391	11.5312	97.4443	4.1671	10.3956	209
MKTSIZE[a]	0.9691	0.1724	8.1456	0.0000	1.6649	261

[a] Indicates that variables are expressed in percent.

4.5 Correlation Matrix

Table 3 presents the correlation matrix for the independent variables used in our baseline model. The signs reported from this matrix should be considered as merely preliminary results, since they are just taking into account the impact of one variable at each time in Equity Home Bias.

We followed Cooper et al (2016) rationale that considered higher than 0,5 correlations among independent variables to be too high and thus, demand to be more carefully analysed because they can induce to lower significance levels. Our correlation matrix indicates a strong correlation among some sets of independent variables, such as our governance variables RL and RQ with INTERNET and with MKTSIZE and even among

them. TRADE and MKTSIZE also have a strong negative correlation. Given these correlations, and according to Cooper et al (2016), we will define 5 separate regression specifications, including, in turn, each variable.

In the following chapter, we will compute the impact of our variables in Equity Home Bias and conclude on their impact in the periods before and after the two economy shocks – Global Financial Crisis and European Sovereign Debt Crisis.

Table 3: Correlation Matrix

This table presents the correlation matrix amongst the independent variables of equation 4.3. FINOP is the logarithm of the Chinn and Ito Index. DISTANCE is the logarithm of the average of the sum of the bilateral flight distance between origin and destination capital cities. INTERNET is the total number of internet users per 100 people. FOREX is a dummy variable that takes the value of 1 if the currency is EUR and 0 otherwise. TRADE is the sum of exports and imports of goods and services measured as a share of gross domestic product. RL is the Rule of Law index from Kaufmann et al (2010) six governance measures. RQ is the Regulatory Quality index from Kaufmann et al (2010) six governance measures. MKTSIZE is the log value of a country's market share of world market capitalization.

	FINOP	DISTANCE	INTERNET	FOREX	TRADE	RL	RQ	MKTSIZE
FINOP	1.0000							
DISTANCE	0.0654	1.0000						
INTERNET	0.3229	-0.3787	1.0000					
FOREX	0.4655	-0.0123	0.2744	1.0000				
TRADE	-0.1646	-0.1559	0.1648	-0.1250	1.0000			
RL	0.4093	-0.2328	**0.6104**	0.3840	0.0814	1.0000		
RQ	0.3718	-0.3374	**0.5844**	0.2114	0.0668	**0.8887**	1.0000	
MKTSIZE	0.4315	-0.1879	0.3854	0.3472	**-0.5777**	**0.5219**	**0.5714**	1.0000

5. Empirical Results

In this Chapter, we present the regression analysis results. We will first compute our Baseline Model and we will test to see which model (Pooled OLS, Fixed Effects or Random Effects model) is more suited to analyse our regression. Additionally, we will analyse an extended model, which will enable us to examine the impact of the Global Financial Crisis and the European Sovereign Debt Crisis on the variables that affect Equity Home Bias. Finally, we will run some Robustness Checks in order to apply the variables that, according to theory and to our Hypotheses, influence Equity Home Bias, but due to missing values were not introduced in our Baseline Model.

5.1 Baseline Empirical Model

As mentioned, we will use regression (4.3) to run our Baseline Model with pooled OLS, or the Fixed Effects model or the Random Effects model, using white's standard errors clustered by country robust to heteroskedasticity and serial correlation within the cluster.

Firstly, we perform an F-test to the Fixed Effects model to understand if the observed and unobserved fixed effects are equal to zero, i.e., if they are equal across all units. Table 4 allows the conclusion that pooled OLS is not appropriate given the level of confidence of the null hypothesis rejection. Additionally, we perform the Hausman (1978) test to select between the Fixed Effects and the Random Effects models. The p-value from the Hausman (1978) test is significant which leads us to reject the null hypothesis[16] and so we can conclude that the Fixed Effects model is the most suitable one.

Table 4: F-test and Hausman test

Eq	F-test	Level of Confidence	Hausman Test
(1)	32.8102	99.9%	11.0212 ***
(2)	37.0318	99.9%	22.7848 ***
(3)	24.2962	99.9%	26.7446 ***
(4)	27.7341	99.9%	42.2077 ***
(5)	38.8644	99.9%	30.0158 ***

In the following table, we present the Fixed Effects model and the OLS model, just for comparison purposes, of the estimation output of our Baseline Model.

[16] The null hypothesis for the Hausman (1978) test states that there is no correlation between the unique country errors and the regressors in the model, i.e., the preferred model is the Random Effects model.

Table 5: Estimation Output of the Baseline Model

This table presents the estimates of the parameters in equation (4.3) using the pooled OLS and the Fixed Effects models, with the variables considered to be highly correlated in section 4.5 separated into columns (1) to (5). The dependent variable is EHB, measured as 1 minus the ratio of foreign equity to foreign equity to total market. CONSTANT is the constant term. FINOP is the logarithm of the Chinn and Ito Index. DISTANCE is the logarithm of the average of the sum of the bilateral flight distance between origin and destination capital cities. INTERNET is the total number of internet users per 100 people. FOREX is a dummy variable that takes the value of 1 if the currency is EUR and 0 otherwise. TRADE is the sum of exports and imports of goods and services measured as a share of gross domestic product. RL is the Rule of Law index Kaufmann et al (2010) six governance measures. RQ is the Regulatory Quality index from Kaufmann et al (2010) six governance measures. MKTSIZE is the log value of a country's market share of world market capitalization. White standard errors clustered by country are in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

	(1)		(2)		(3)		(4)		(5)	
	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects
constant	122.0448 ***	94.19686 ***	121.9474 ***	106.7961 ***	112.9752 ***	67.64181 ***	123.6303 ***	62.82009 ***	95.81485 ***	142.4570 ***
	(4.909612)	(2.603365)	(2.549991)	(3.952588)	(1.793662)	(5.012441)	(2.745524)	(4.510314)	(2.747264)	(8.734064)
FINOP	-0.224013 ***	0.031392	-0.400066 ***	-0.006932	-0.239430 ***	-0.153640 ***	-0.219792 ***	-0.187321 ***	-0.316611 ***	-0.259558 ***
	(0.032895)	(0.038585)	(0.029030)	(0.033940)	(0.031694)	(0.020786)	(0.032936)	(0.028579)	(0.024909)	(0.035887)
FOREX	-12.75349 ***	-14.96169 ***	-15.75223 ***	-6.939777 ***	-11.77232 ***	-17.34631 ***	-15.61489 ***	-17.58024 ***	-13.97425 ***	-2.537295
	(1.172709)	(3.292197)	(2.108950)	(2.626236)	(0.823732)	(3.819981)	(0.967374)	(3.698167)	(1.659540)	(4.279997)
INTERNET	-0.479378 ***	-0.362200 ***								
	(0.035878)	(0.020977)								
TRADE			-8.408725 ***	-34.20336 ***						
			(1.790667)	(5.817782)						
RL					-15.38363 ***	23.05362 ***				
					(0.663691)	(5.414191)				
RQ							-22.84911 ***	28.13355 ***		
							(2.044990)	(4.418366)		
MKTSIZE									-3.687515 ***	19.59293 ***
									(0.771713)	(3.050343)
R-squared	0.574604	0.895756	0.417024	0.869789	0.521042	0.862838	0.524432	0.876300	0.396733	0.870244
Adjusted R-squared	0.569103	0.884447	0.409485	0.855662	0.514328	0.846577	0.517765	0.861634	0.388933	0.856166
Obs	236	236	236	236	218	218	218	218	236	236
F-statistic	104.4581 ***	79.20398 ***	55.31932 ***	61.57074 ***	77.60108 ***	53.06043 ***	78.66261 ***	59.75237 ***	50.85765 ***	61.81878 ***

The first model, pooled OLS, translates into pooling the observations together and running the regression model, neglecting the cross section and time series nature of our data. The major problem with this model is that it does not distinguish between the various countries, i.e., by combining the 21 countries by pooling, we are denying the heterogeneity or individuality that may exist. The main difference between the Fixed Effects and the Random Effects model is whether the predictors/regressors are correlated with the country error term. In the latter, it must be admitted that there does not exist correlation between the individual effects and the perturbance term and in the Fixed Effects model, such correlation exists.

The adjusted R-square for our equations under the Fixed Effects models is close to 85%, which indicates a strong significance of the variables of our model and the p-value of the global significance tests allows to conclude on the high accuracy and reliability of our independent variables in explaining Equity Home Bias.

According to our Hypothesis 1 (H1), direct barriers to international capital flows are expected to have a positive impact on Equity Home Bias, hence the financial openness indicator (FINOP) should have the opposite sign. The regression result has the sign as expected and is statistically significant in equations (3), (4) and (5) which is consistent with previous findings (Bose et al, 2014; Mondria & Wu, 2010), suggesting that a higher level of financial openness allows for better international diversification opportunities, and hence, leads to a decrease of Equity Home Bias.

The results for the FOREX variable are coincident with our Hypothesis 3 (H3) and are statistically significant in equations (1) to (4), meaning that the negative coefficient from this variable indicates that the existence of exchange rates barriers has a positive impact on the Equity Home Bias. These results are also present in other empirical findings (e.g. Bose et al, 2014).

In Hypothesis 2 (H2) we infer on the positive relation between information asymmetries and Equity Home Bias. Given that the variable DISTANCE is time invariant we could not include it in our Fixed Effects model, since it is already being captured (along with other time invariant variables) in the dummies of this model. The second variable goes as expected, because the rationale of the INTERNET variable is that it behaves opposite the information asymmetry one, thus the regression result suggests that there is a negative

relation between the number of internet users per 100 people and Equity Home Bias. This result indicates that this proxy has a statistically significance at a 1% level, which shows that a higher level of internet users suggests the diminishment of information asymmetries. These results coincide with previous findings (e.g. Mondria & Wu, 2010; Amadi, 2004).

Our TRADE variable is also behaving according to our Hypothesis 4 (H4), in which it was expected a negative relation of a familiarity proxy such as exchange trade and Equity Home Bias, meaning that a higher trade of consumer goods indicates a higher financial assets' trade which is then related to an Equity Home Bias decrease. According to our results, this variable, apart from having a negative sign, is also statistically significant, which coincides with the literature (e.g. Mishra, 2015; Cooper et al, 2013).

Hypothesis 5 (H5) expected sign and our estimation results are positive for our two governance variables – Rule of Law (RL) and Regulatory Quality (RQ). This translates into better governance and regulation policies at home, increasing Equity Home Bias, as shown in Kho et al (2009).

Hypothesis 7 (H7) indicates the expected positive relation between a country's size share in the world market capitalization and Equity Home Bias. Our results are in accordance with H7 since they indicate that a larger country has better diversification opportunities at home and, in fact, it is possible to conclude that a 1% increase in a country's market size generates an approximate 0.19pp increase in Equity Home Bias. This variable is statistically significant at a 1% level and is in accordance with the literature (e.g. Mishra, 2015).

In conclusion, we can state that the variables of our baseline model can jointly influence Equity Home Bias, that our model is appropriate and that our results are in accordance with our expectations and the literature's.

5.2 Extended Model

This section's purpose is to identify the differences in the explanatory power of the variables of the baseline model in describing Equity Home Bias when considering the Global Financial Crisis and the European Sovereign Debt Crisis. In our analysis, we will

address this crises period as an uncertainty period and so, in this section, we will also test our Hypothesis 8 (H8) – Retrenchment Behaviour.

As explained in Chapter 4, the Global Financial Crisis effects triggered in 2008 and had an observable positive impact in the Equity Home Bias, as seen in Figure 6 and explained in section 4.1.1. The European Sovereign Debt Crisis' impact, in the most affected economies, developed in 2010 and lasted, strongly, until 2012, as evidenced in figure 4. With this information, we computed a *crises period* that is comprehended by 2008-2012.

Firstly, we compute an F-test to each equation to infer on the pertinence of adding these variables, i.e., to understand if the analysis using this time break is relevant for our study. The result is shown in Appendix A.1 and, given its statistical significance, we can reject the null hypothesis that stated that all the additional coefficients were equal to zero.

After setting the validity of this analysis, we computed equation (4.4) and Table 6 returns the output of this regression model using the Fixed Effects model. This model was already proven to be the most suited in our Baseline Model, and so, for consistency we will keep relying on its results for our analyses.

Table 6: Estimation Output of the Extended Model

This table presents the estimates of the parameters in equation (4.4) using the pooled OLS and the Fixed Effects models, with the sets of variables considered to be highly correlated in section 4.5 separated into columns (1) to (4). The dependent variable is EHB, measured as 1 minus the ratio of foreign equity to foreign equity to total market. CONSTANT is the constant term. DUMMYYEARS is a dummy variable that takes the value of 1 if the year is between 2008 and 2012 and 0 otherwise. FINOP is the logarithm of the Chinn and Ito Index. DFINOP is the product between DUMMYYEARS and FINOP. INTERNET is the total number of internet users per 100 people. DINTERNET is the product between DUMMYYEARS and INTERNET. FOREX is a dummy variable that takes the value of 1 if the currency is EUR and 0 otherwise. DFOREX is the product between DUMMYYEARS and FOREX. TRADE is the sum of exports and imports of goods and services measured as a share of gross domestic product. DTRADE is the product between DUMMYYEARS and TRADE. RL is the Rule of Law index Kaufmann et al (2010) six governance measures. RQ is the Regulatory Quality index from Kaufmann et al (2010) six governance measures. DRL is the product between DUMMYYEARS and RL. RQ is the Regulatory Quality index from Kaufmann et al (2010) six governance measures. DRQ is the product between DUMMYYEARS and RQ. MKTSIZE is the log value of a country's market share of world market capitalization. DMKTSIZE is the product between DUMMYYEARS and MKTSIZE. White standard errors clustered by country are in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 6: Estimation Output of the Extended Model (cont.)

	(1)		(2)		(3)		(4)		(5)	
	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects	Pooled OLS	Fixed Effects
constant	118.0586 ***	91.26038 ***	126.2611 ***	111.0283 ***	110.2787 ***	62.46627 ***	120.9012 ***	58.29952 ***	95.53293 ***	131.1331 ***
	(3.685714)	(2.924680)	(4.016090)	(5.080360)	(1.271646)	(6.558406)	(1.970746)	(4.850051)	(4.391939)	(12.65387)
DUMMYYEARS	42.03211 ***	0.349018	-3.170627	-3.222648	12.10687 ***	0.225500	14.82569 ***	0.161998	2.049221	11.93759 ***
	(6.244292)	(4.562101)	(5.101184)	(3.659177)	(2.352794)	(5.156131)	(4.214095)	(4.120495)	(5.253685)	(3.710018)
FINOP	-0.183840 ***	0.062908	-0.398594 ***	0.041640 *	-0.185722 ***	-0.072629 **	-0.178257 ***	-0.092332 **	-0.304547 ***	-0.180193 ***
	(0.030890)	(0.038231)	(0.047693)	(0.024975)	(0.033717)	(0.044028)	(0.040352)	(0.048899)	(0.040910)	(0.058383)
DFINOP	-0.304803 ***	-0.133157 ***	-0.071901	-0.112291 ***	-0.179428 ***	-0.097124	-0.153419 ***	-0.142135 ***	-0.089188 *	-0.153868 ***
	(0.038400)	(0.040872)	(0.058186)	(0.040565)	(0.040661)	(0.047172)	(0.053567)	(0.045505)	(0.045679)	(0.032069)
FOREX	-12.21100 ***	-15.33363 ***	-15.15435 ***	-12.74995 ***	-11.67261 ***	-15.55711 ***	-14.66101 ***	-17.33039 ***	-11.43505 ***	-0.356141
	(1.748157)	(0.050274)	(3.212747)	(3.305995)	(0.954456)	(5.070307)	(1.403070)	(4.957060)	(2.152392)	(4.044751)
DFOREX	-1.183291	-1.074569	-3.275081	0.189262	1.464646	1.618003	-1.310516	3.007775	-6.104721 **	-0.069981
	(2.343854)	(0.057795)	(3.557581)	(1.310676)	(1.737351)	(2.188272)	(2.260079)	(1.920839)	(2.435785)	(1.759972)
INTERNET	-0.498858 ***	-0.342897 ***								
	(0.037335)	(4.334475)								
DINTERNET	-0.142146 **	0.165484 ***								
	(0.060027)	(1.581208)								
TRADE			-12.56092 ***	-37.63084 ***						
			(2.220499)	(5.896030)						
DTRADE			9.472613 ***	8.274293 ***						
			(2.647219)	(1.889525)						
RL					-15.38843 ***	22.29603 ***				
					(0.538301)	(5.320047)				
DRL					-2.144316 *	1.176360				
					(1.193310)	(1.697811)				
RQ							-22.31246 ***	26.46589 ***		
							(2.344374)	(3.286828)		
DRQ							-4.894795	4.400546 **		
							(4.143067)	(2.373329)		
MKTSIZE									-3.462628 ***	17.59397 ***
									(1.051018)	(4.038674)
DMKTSIZE									-2.057940	1.418463
									(1.426624)	(1.147971)
R-squared	0.597614	0.901621	0.435174	0.891691	0.542635	0.881755	0.547820	0.894586	0.418100	0.887000
Adjusted R-squared	0.585260	0.888851	0.417833	0.877632	0.527389	0.864952	0.532747	0.879606	0.400235	0.872332
Obs	236	236	236	236	218	218	218	218	236	236
F-statistic	48.37430 ***	70.60283 ***	25.09492 ***	63.42362 ***	35.59309 ***	52.47543 ***	36.34522 ***	59.71932 ***	23.40288 ***	60.47072 ***

The adjusted R-square value of these estimations output indicates a value of approximately 88%, on average, which reinforces the idea that our independent variables are good contributors to the explanation of our model, which translates into our Crises Period Model being appropriate. Additionally, the p-value of the global significance test suggests that the independent variables are appropriate and accurate in explaining our dependent variable.

By analysing the output of the extended model, we can infer that the level of financial openness (FINOP) is negative and statistically significant through the non-crises period in equations (3) to (5) and in equations (1) and (2), the estimated impact on EHB is positive. In the 2008-2012 period, there is empirical evidence that the estimated impact on Equity Home Bias changed in equations (1), (2), (4) and (5), with FINOP negatively impacting EHB by 0.07pp, 0.07pp, 0.23pp and 0.33pp, respectively, when it increased 1pp, given the parameter statistical significance level. In equation (3), the estimated negative impact of FINOP, in the crises period, was of 0.17pp when EHB increased 1pp, however there is not statistical evidence of a change in impact from the non-crises to the crises period. These negative estimated impacts of the abolishment of direct barriers is as expected according to Hypothesis 1 (H1), but do not support Hypothesis 8 (H8) argument, since there was a higher negative impact from FINOP in the crises period, rather than in the non-crises period. It could be concluded that investors do not interpret a generalized mistrust surrounding financial markets as a barrier to international investment.

FOREX proved to have a negative estimated impact in EHB at statistically significant level in the non-crises period in equations (1) to (4). This result is consistent with our Hypothesis 3 (H3), which indicates that the non-existence of exchange rate barriers has a negative impact on EHB. However, even though the estimated impact in EHB for the crises period is negative in all equations, there is no empirical evidence of a change in such impact from the non-crises period to the 2008-2012 one.

The high statistical significance of INTERNET enables us to infer on the relevance of the number of internet users per 100 persons for the Equity Home Bias on the non-crises period, generating a negative estimated impact of -0.34pp considering a 1pp increase in this variable, which is as expected by our Hypothesis 2 (H2). Also, the high statistical significance of DINTERNET allows the conclusion that there is empirical evidence of a change in the impact of the coefficient during the crises period, i.e., INTERNET had a

lower negative estimated impact on EHB since a 1pp increase in the number of internet users per 100 people only generated a decrease of 0.17pp (-0.3429+0.1655) in the Equity Home Bias in the 2008-2012 period. This result could indicate that during times of uncertainty, investors find that the lower information costs given the higher information availability and easiness, is less appealing in inciting them to internationally diversify their portfolios.

In addition, there is also empirical evidence for the estimated impact of the familiarity proxy on EHB being less negative (29pp) during the crises period than in the non-crises period (37pp), considering a 1 unit increase in TRADE. These results are as expected by Hypothesis 4 (H4) and show that the negative impact on EHB diminishes in times of retrenchment.

Moreover, our Rule of Law governance variable is statistically significant in the non-crises period and has a positive estimated impact on Equity Home Bias of 22pp, considering a 1 unit increase in the rule of law index. In the crises period, the estimated negative impact is of 23pp, although there is no empirical evidence for a change is such impact. These results are sustained by our Hypothesis 5 (H5) since they reveal that in the whole period of our sample domestic investors are strongly driven by the quality of contract enforcement, of the courts and the police, hence the respect of the state for the institutions that govern economic and social interactions is important in the investment-decision time, which results in a higher Equity Home Bias.

Regulatory Quality (RQ), our other governance variable, also has a positive estimated impact in EHB during the non-crises period, which is therefore according to our Hypothesis 5 (H5). In this case, there is empirical evidence for the change in the estimated impact of RQ in EHB, which ultimately results in a positive effect of 30.84pp in the crises period (rather than a rise of 26.46pp in the non-crises period) given a 1 unit in the regulatory quality index. These coefficients suggest that during times of uncertainty, domestic investors are even more driven by the capacity of the government to effectively formulate and implement sound policies. This result also gives robustness to our Hypothesis 8 (H8), since in times of uncertainty there is a generalized decline of business confidence and so, this could explain the shift in the impact of regulatory quality on EHB, i.e., investors were so mistrust in financial markets, institutions, governments, etc., that the extent to which agents perceived the ability of a government to implement regulations

that permit and promote private sector development, incited more domestic investment, leading to a more pronounced positive impact on Equity Home Bias.

Finally, MKTSIZE is statistically significant, which indicates that the size of the market had a positive estimated impact of 0.17pp, considering a 1% increase in the size ratio generated during the non-crises period and of 0.19pp in the crises period, even though there is no empirical evidence for the change in the impact in the crises period. These results complement our Hypothesis 7 (H7), since they translate into higher diversification opportunities at home, enabled by the bigger share of a country's size in the world market capitalization, increasing EHB.

Table 7 below evidences the conclusions regarding the signs and impacts of the coefficients studied in our Baseline model and in our Extended model.

Table 7: Estimation Coefficients and Expected Signs: the Impact of Economy Shocks

		Baseline Model		Crises Period Model				Expected Sign according to our Hypotheses
				Non-Crises Period		Crises Period		
		2001-2015		2001-2007 ; 2013-2015		2008-2012		
	Eq	Sign	Impact (pp)	Sign	Impact (pp)	Sign	Impact (pp)	Sign
FINOP	(1)		INSIGNIFICANT		INSIGNIFICANT		-0.07	
	(2)		INSIGNIFICANT	+	+0.04		-0.07	
	(3)	-	-0.15	-	-0.07	-	-0.07	-
	(4)		-0.18	-	-0.09		-0.23	
	(5)		-0.29	-	-0.18		-0.33	
FOREX	(1)		-14.96		-15.33		-16.41	
	(2)		-6.93		-12.75		-12.56	
	(3)	-	-17.34	-	-15.55	-	-13.94	-
	(4)		-17.58		-17.33		-14.32	
	(5)		-2.54		-0.37		-0.43	
INTERNET	(1)	-	-0.36	-	-0.34	-	-0.17	-
TRADE	(2)	-	-34.20	-	-37.63	-	-29.35	-
RL	(3)	+	+23.05	+	+22.29	+	+23.47	+
RQ	(4)	+	+28.13	+	+26.46	+	+30.84	+
MKTSIZE	(5)	+	+0.19	+	+0.17	+	+0.19	+

We can conclude that, overall, the signs of the estimated impacts in the non-crises period and in the crises period were not changed.

In one hand, the ones that negatively influenced EHB in the non-crises period (FINOP, FOREX, INTERNET and TRADE), in the 2008-2012 period maintained their negative estimated impact but at lower levels, except for FINOP.

On the other hand, those with a positive impact in the non-crises period (RL, RQ and MKTSIZE), amplified their effects in the 2008-2012 period.

In conclusion, these results contribute to what we exposed in Hypothesis 8 (H8) in the sense that they show that there are more variables impacting less negatively/more positively the EHB in periods of uncertainty.

5.3 Robustness Checks

In this section, we will introduce, in turn, the variables that were not part of our previous models to infer on their relationship with the hypotheses we developed in Chapter 3. As mentioned, they were not included earlier due to their missing values, so our analysis will be made considering the reduction in the sample. For this analysis, we aim to continue using equation (4.4) using fixed effects, and add, one by one, our additional variables. However, we will first test to see if we can use such equation or if we can just rely on equation (4.3). For that, we will perform an F-test with the null hypothesis being that all added coefficients are equal to zero.

Table 10 from Appendix A.1 allows to infer that we can only reject the null hypothesis for equations (7) and (8). Thus, for equation (6) we will not be able to conclude on the crises period impact, but solely on the impact of the withholding tax on dividends on Equity Home Bias throughout the sample period. As for equations (7) and (8), the analysis will be consistent to the one presented in the previous section.

Table 8 evidences the 3 estimation outputs, where (6) refers to the introduction of the other proxy for information asymmetry – TAXDIV – and (7) and (8) indicate the addition of our concentration variables, COMPCONC and INDCONC, respectively.

Table 8: Robustness Checks

This table presents the coefficient estimates of the robustness checks of equations (6) using equation 4.3 and equations (7) and (8) using equations 4.4., using the Fixed Effects model. The dependent variable is EHB, measured as 1 minus the ratio of foreign equity to foreign equity to total market. CONSTANT is the constant term. DUMMYYEARS is a dummy variable that takes the value of 1 if the year is between 2008 and 2012 and 0 otherwise. FINOP is the logarithm of the Chinn and Ito Index. DFINOP is the product between DUMMYYEARS and FINOP. TAXDIV is the highest withholding tax rate on dividends. DTAXDIV is the product between DUMMYYEARS and TAX DIV. COMPCONC is the Herfindahl-Hirschman Index computed as the sum of the square of the market share of each listed company. DCOMPCONC is the product between DUMMYYEARS and COMPCONC. INDCONC is the Herfindahl-Hirschman Index computed as the sum of the square of the weight of an industry in the index market capitalization of each country. White standard errors clustered by country are in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

	(6)	(7)	(8)
	Using equation 4.3	Using equation 4.4	Using equation 4.4
constant	-1.068929	64.03615 ***	63.71026 ***
	(8.637299)	(1.848220)	(1.781053)
DUMMYYEARS		7.556799 ***	4.153429
		(1.594994)	(3.346065)
FINOP	0.819621 ***	-0.001444	-0.001600
	(0.076716)	(0.018745)	(0.019465)
DFINOP		-0.133099 ***	-0.112188 ***
		(0.028438)	(0.034690)
FOREX	-19.10855 ***		
	(3.302334)		
DFOREX			
TAXDIV	-0.009891		
	(0.332709)		
DTAXDIV			
COMPCONC		0.030525	
		(0.028676)	
DCOMPCONC		0.019500	
		(0.110777)	
INDCONC			0.043791
			(0.029413)
DINDCONC			0.112646
			(0.101913)
R-squared	0.904485	0.905512	0.905035
Adjusted R-squared	0.886116	0.890975	0.890425
Obs	125	151	151
F-statistic	49.24150 ***	62.29170 ***	61.94632 ***
Sample	2007-2014	2001-2014	2001-2014

All three regressions have a high adjusted R-squared and significant F-statistics, which indicates that the three models are appropriate and the independent variables can jointly and accurately explain Equity Home Bias.

The withholding tax rate on dividends in our regression reveals to be statistically insignificant to Equity Home Bias from 2007-2014, which is the whole sample for equation (6). This result is not as expected according to our Hypothesis 1 (H1) because there should be empirical support for the negative impact of this direct barrier on EHB. However, FINOP, also a proxy for direct barriers on investment, reveals to have a positive impact on EHB during this period. One conclusion we can gather is that this period is very close to our crises period, and so we can infer that the latter is a consequence of retrenchment, though that still does not explain TAXDIV behaviour. We are left with the rationale that, in that time period, investors did not find this direct barrier to be of interest in their investment decision, even though, theory does not support such conclusion.

In equations (7) and (8), the concentration variables COMPCONC and INDCONC also reveal to be statistically insignificant to EHB, both in the crises and non-crises periods aligned with the fact that there is no empirical evidence for the change in their impact in the crises period. These results are then not expected according to our Hypothesis 6 (H6), because investors should aim to reduce their concentration risk either on a company or industry level, especially in times of uncertainty.

In conclusion, we can state that the additional variables constituting our robustness checks did not produce any empirical evidence of the impact to Equity Home Bias in the periods considered, which was a surprising result since it was not expected according to our Hypotheses. These results allow to infer that, in our sample, investor do not find the withholding tax rate on dividends nor the company and industry concentration to be relevant variables to their investment decisions.

6. Conclusions

Equity Home Bias has been studied for several decades and financial literature describes it as a puzzle because even though many possible explanations have emerged, neither has the power to explain its evolution and persistence through time.

The common realization has been that it cannot be explained by just one factor, but by a variety of them, grouped together into two main sources. The first one is linked to institutional or fundamental arguments, which are driven by a cost-benefit approach such as transaction costs, trade flows, information costs, governance, among others. The other one is related to behavioural explanations, which are, intuitively, influenced by the investor's conduct, such as familiarity, conservatism, overconfidence, etc. In addition, we completed this inference by highlighting the role of financial or economic crises, which have a direct impact in the investment pattern of investors and, thus, could affect Equity Home Bias.

In fact, there is also an approach that focuses on the Equity Home Bias (mis)calculation as a factor that could generate misleading results, but as Mishra (2015) summarized, the use of different benchmarks enables to obtain different home bias results, however, not as different as to disregard its existence and general idea, i.e., that it has been considerably high over time.

In this paper, we propose to analyse how the financial and economic crises impacted Equity Home Bias determinants over the period from 2001 to 2015 in EU countries. We analyse the Global Financial Crisis and the European Sovereign Debt Crisis. We observed, beforehand, that, when the Global Financial Crisis arose, Equity Home Bias increased, which was as we expected according to the retrenchment theory.

Our baseline model estimates show that our proxy for information asymmetry (number of internet users) had a negative impact on Equity Home Bias, as expected and regarded by Mondira & Wu (2010), indicating that the lower the barriers of information flows, the more investors seek investment opportunities in foreign markets. Also, in general, the level of financial openness and the abolishment of exchange rate risk have a negative effect on Equity Home Bias, as expected and based on the works of Mondria & Wu (2010) and Bose et al (2014), respectively. In addition, our proxies for familiarity (Mishra, 2015;

Cooper et al, 2013), governance (Kho et al, 2009) and market size (Mishra, 2015) are associated with higher Home Bias, as expected.

Afterwards, we run a model specification to control for the effects of both the crises. We show that, in general, our proxy for direct barriers (the level of a country's financial openness) has a negative effect on Home Bias, as expected, but its impact is more negative in the crises period. The exchange rate risk proxy has, in general and as expected, a negative effect on Home Bias, however, there is no empirical evidence of a change in the estimated impact during the crises period. The information asymmetry and trade proxies have a less negative estimated impact on Equity Home Bias, suggesting that investors tend to internationally diversify more their portfolios in periods of greater uncertainty. Both governance and regulation proxies have a positive estimated impact on Home Bias, with the Regulatory Quality index having empirical evidence for its amplified effect in the crisis period, contrary to the Rule of Law index. Market size maintained its positive impact on Home Bias, but also with no empirical evidence for the more positive effect in the crises period.

We were able to conclude that Equity Home Bias is more positively/less negatively impacted during the crises period, which reveals that in uncertainty periods investors are more averse to investing in foreign markets.

Additionally, when we add three more variables to our model that were left out due to data unavailability, we conclude that nor our direct barrier proxy (taxes) nor the company and industry concentration in the domestic market one have empirical evidence for a change in their impact on Equity Home Bias in the crises period.

Overall, we found support for institutional/fundamental and behavioural arguments since, first, our proxies produced an effect on Equity Home Bias and followed such theories and explanations. We also realized that in times of greater uncertainty there is a tendency for the proxies' impact to change.

In addition, since most empirical work on Equity Home Bias focuses more on the impact of different variables, within different countries or different periods, we believe we made an important contribution to the finance literature by focusing on studying the differences of the economic and financial crises impact on EHB.

We believe further research could be made based on our rationale but regarding different dependent variables, such as Debt Home Bias or Foreign Bias. Also, other independent variables could be added, namely, a higher focus could be given to the realized returns on each domestic market. Finally, using a wider sample, it would be possible to compare the impact of the different institutional and behavioural effects between developed and developing countries and if they respond in similar ways in periods of crisis.

Appendices

Appendix A.1 – Statistic Tests

Table 9: Extended Model F-test

Equation	F-test	Level of Confidence
(1)	3.1001	97.5%
(2)	10.5153	99.9%
(3)	7.5991	99.9%
(4)	8.2397	99.0%
(5)	4.9239	99.0%

Table 10: Robustness Checks F-test

Equation	F-test	Level of Confidence
(6)	1.2669	-
(7)	6.4270	99.9%
(8)	6.3714	99.9%

Appendix A.2 – Robustness Checks

Table 11: Robustness Checks – Complementary Outputs

This table presents the coefficient estimates of the complementary robustness checks of equations (6) using equation 4.4 and equations (7) and (8) using equations 4.3., using the Fixed Effects model. The dependent variable is EHB, measured as 1 minus the ratio of foreign equity to foreign equity to total market. CONSTANT is the constant term. DUMMYYEARS is a dummy variable that takes the value of 1 if the year is between 2008 and 2012 and 0 otherwise. FINOP is the logarithm of the Chinn and Ito Index. DFINOP is the product between DUMMYYEARS and FINOP. TAXDIV is the highest withholding tax rate on dividends. DTAXDIV is the product between DUMMYYEARS and TAX DIV. COMPCONC is the Herfindahl-Hirschman Index computed as the sum of the square of the market share of each listed company. DCOMPCONC is the product between DUMMYYEARS and COMPCONC. INDCONC is the Herfindahl-Hirschman Index computed as the sum of the square of the weight of an industry in the index market capitalization of each country. White standard errors clustered by country are in parenthesis. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

	(6)	(7)	(8)
	Using equation 4.4	Using equation 4.3	Using equation 4.3
constant	3.836740	65.58073 ***	64.61281 ***
	(11.12302)	(2.124796)	(2.413199)
DUMMYYEARS	11.68120 ***		
	(3.569960)		
FINOP	0.780126 ***	-0.043083 **	-0.039739 *
	(0.172045)	(0.020128)	(0.023893)
DFINOP	-0.107938 *		
	(0.063110)		
FOREX	-22.39588 ***		
	(4.799765)		
DFOREX	3.222152		
	(2.568571)		
TAXDIV	0.095326		
	(0.371010)		
DTAXDIV	-0.312300 *		
	(0.162590)		
COMPCONC		0.072359 **	
		(0.031936)	
DCOMPCONC			
INDCONC			0.097492 **
			(0.039463)
DINDCONC			
R-squared	0.909092	0.891072	0.891498
Adjusted R-squared	0.887274	0.877148	0.877629
Obs	125	151	151
F-statistic	41.66712 ***	63.99912 ***	64.28117 ***
Sample	2007-2014	2001-2014	2001-2014

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